

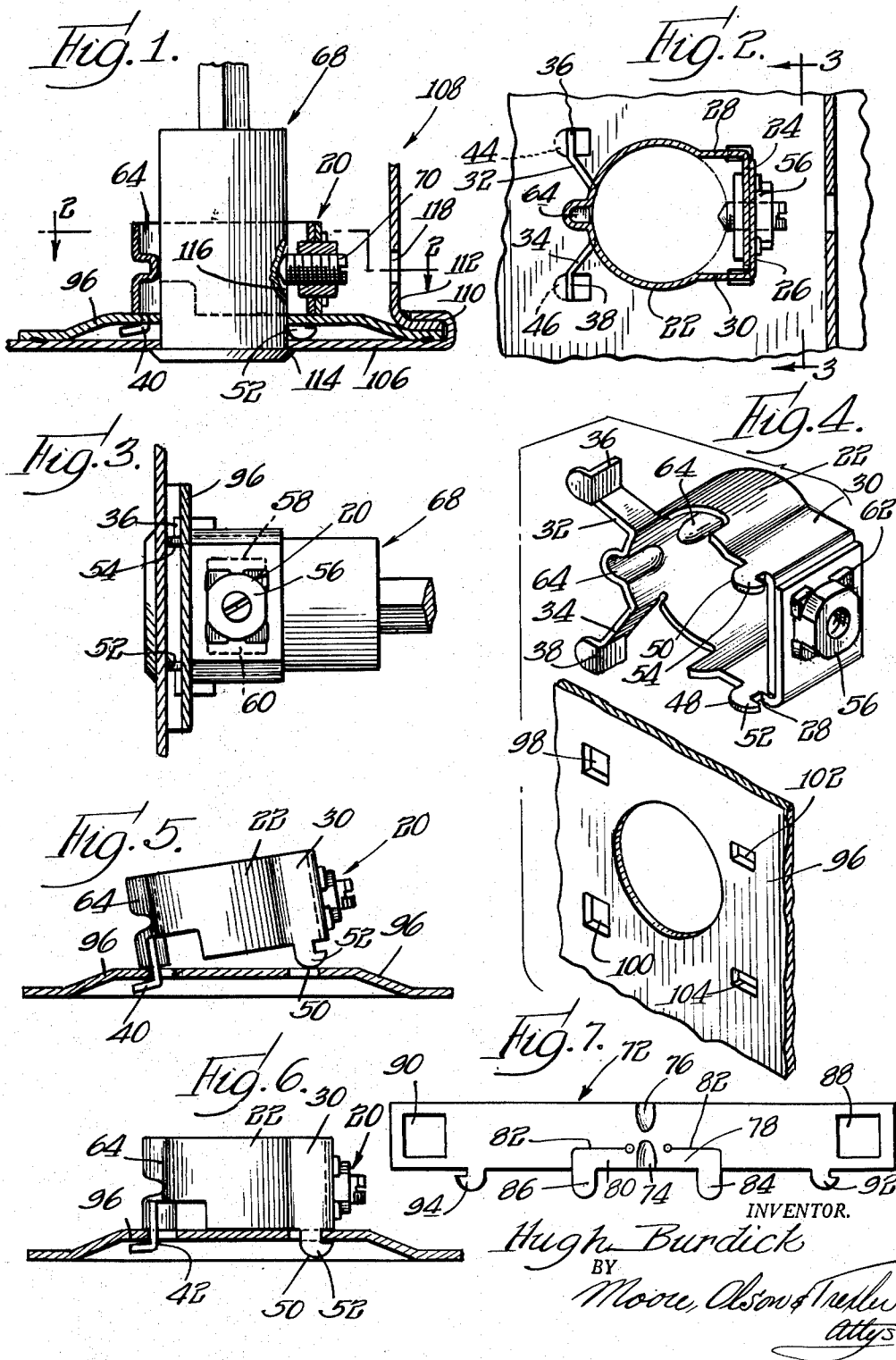
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DOOR LOCK RETAINER

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2 SHEETS—SHEET 1



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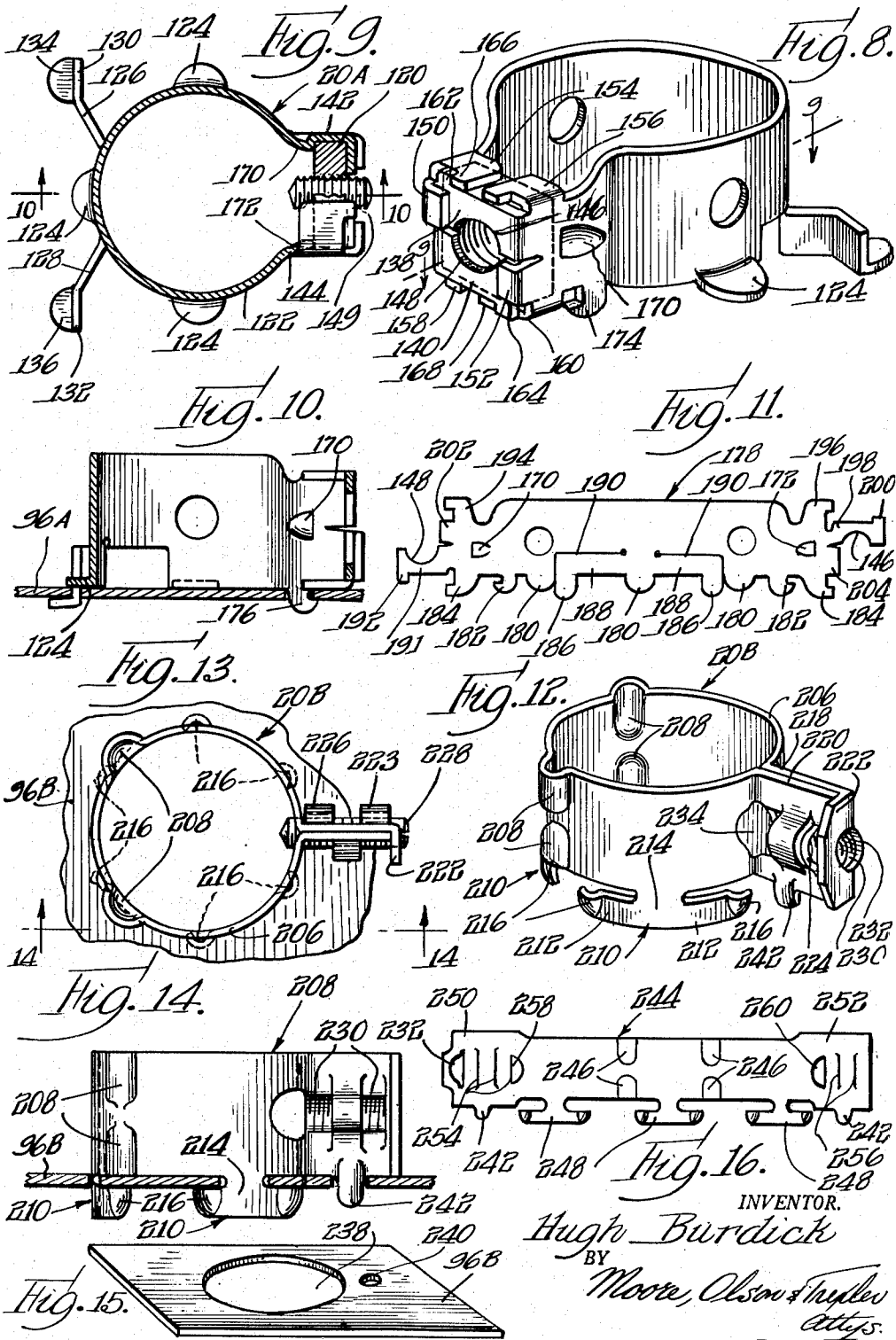
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2 SHEETS—SHEET 2



UNITED STATES PATENT OFFICE

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DOOR LOCK RETAINER

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11 Claims. (Cl. 70—370)

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This invention relates to retaining or fastening devices for removably securing cylindrical lock structures or the like in apertured panels.

It is an object of this invention to provide an improved retaining or fastening device for mounting and securing a cylinder door lock or the like in an apertured panel, and more particularly to the doors or compartments of an automobile.

Various structures have heretofore been proposed for mounting and securing a cylinder or pillar lock to the door of an automobile, but these devices have not been entirely satisfactory for a number of reasons. Some of the devices have been unsatisfactory because of the difficulty of mounting them on the door structure; some because of the difficulty of fitting the cylinder lock in them, particularly when the external diameter of the lock varies somewhat from the standard; some because they cannot offer sufficient resistance or possess sufficient locking action against axial or turning movement of the outer barrel of the lock, particularly when, by an accumulation of rust or dirt in the lock, the turning of the internal cylinder of the lock causes a strong turning force to be applied to the outer barrel of the lock; some because of the difficulty of removing a broken or defective lock; and many have been unsatisfactory because of their high cost of manufacture or assembly.

It is accordingly an object of this invention to provide a door lock retainer or fastening device of such structure as to be capable of ready and simple application to the door; to permit ready insertion of the lock in the retainer; to provide most effective means for fastening the lock against axial and rotative movement; to permit ready removal of a broken and defective lock, and to be relatively inexpensive to manufacture and assemble with the door structure or like panel.

The present invention contemplates the provision of a relatively inexpensive lock retainer or fastening device composed of a nut structure secured to or formed integrally with a sheet metal generally cylindrical retainer bent from a flat, one-piece stamping, and bent or rolled into cylindrical form with end portions interlocked and secured in interlocked relation by the structure of the retainer or its assembly with the panel on which the lock is to be mounted.

A more specific object of the invention is to provide a cylindrical, sheet metal, lock retainer formed from a sheet metal stamping and having free end portions thereof secured in permanent relation by a nut structure secured to or formed

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integrally with the retainer when rolled or otherwise formed into the cylindrical shape.

A further, more specific object of the invention is to provide a retainer which shall be most effective to secure a cylindrical lock or the like against axial or rotative movement and yet will not become bound to the lock so that a broken or defective lock may be most readily removed and replaced.

Other and further objects and advantages will be apparent from the following description when taken in connection with the accompanying drawings wherein:

Fig. 1 is a view in horizontal section through a door assembly with one embodiment of the lock retainer operatively associated therewith;

Fig. 2 is a view in vertical section taken substantially along line 2—2 of Fig. 1;

Fig. 3 is a view in vertical section taken substantially along line 3—3 of Fig. 2;

Fig. 4 is a fragmentary view in perspective of the lock retainer of Figs. 1 to 3, and the mounting plate or panel therefor;

Figs. 5 and 6 are diagrammatic views in horizontal section through the mounting plate or panel and showing the manner of assembly of the retainer therewith;

Fig. 7 is a view of the sheet metal stamping or blank of which the retainer of Figs. 1 to 6 is formed;

Fig. 8 is a perspective view of a modified form of the lock retainer;

Fig. 9 is a view in horizontal section taken substantially along the line 9—9 of Fig. 8;

Fig. 10 is a view in vertical section taken substantially along the line 10—10 of Fig. 9;

Fig. 11 is a view of the sheet metal stamping or blank from which the retainer of Figs. 8 to 10 is formed;

Fig. 12 is a view in perspective of a second modified form of the lock retainer;

Fig. 13 is a top view of the retainer shown in Fig. 12;

Fig. 14 is a view in vertical section taken substantially along the line 14—14 of Fig. 13;

Fig. 15 is a view in perspective of an adapter or mounting panel for the modified retainer of Figs. 12 to 14; and

Fig. 16 is a view of the sheet metal stamping or blank of which the retainer of Figs. 12 to 14 is formed.

Referring to the drawings more in detail, wherein like numerals have been employed to designate similar parts throughout the various figures, it will be seen that the present invention

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contemplates a lock retainer or fastener means or device designated generally by the numeral 20. Lock retainer 20 comprises a sheet metal strip wrapped or rolled into a cylinder or barrel 22 with the free end portions 24 and 26 overlapped and lying parallel to a diameter of the cylinder and joined to the cylinder by substantially parallel flange portions 28 and 30. The cylinder on the side opposite the overlapped end portions 24 and 26 and at the lower end thereof is formed with integral outwardly extending divergent resilient leg portions 32 and 34. The outer end sections 36 and 38 of the leg portions 32 and 34 extend substantially parallel to the overlapped free end portions and are provided with dependent tabs 40 and 42 terminating in outwardly bent lug or tab portions 44 and 46. Dependent from the flanges 28 and 30, which are perpendicular to the overlapped end portions 24 and 26, are shouldered latch lugs or tabs 48 and 50 having nose portions 52 and 54 extending toward the free end portions in spaced relation to the lower edges of the flanges 28 and 30.

The free end portions 24 and 26 are secured in overlapped relation by a nut structure 56 which, in the form shown in Figs. 1 to 6, preferably comprises a square nut received in aligned openings in the free end portions and having flanges 58 and 60 projecting from opposite sides thereof to extend over the inner surface of the free end portion 24 adjacent the opening therein. The flanges 58 and 60 extend from opposite sides of the nut body only from one end thereof so that the main body of the nut projects through the opening in the overlapped free end portions 24 and 26 and projects outwardly therefrom. Corners of the nut are staked over the outer surface of the free end portion 26, as at 62, to retain the nut in assembled relation.

Interrupted, vertically placed rib 64 in the barrel or cylinder 22 opposite the overlapped end portion forms a laterally extending foot, shoulder or retainer supporting portion engageable with the adapter or work panel to support the retainer. The rib strengthens and rigidifies the barrel and the interruption of the rib prevents enlargement of the retainer body when the barrel lock 68 is clamped against the wall of the retainer by the set screw 70.

The retainer 20 is formed from a sheet metal blank 72, as illustrated in Fig. 7, the blank being stamped from a larger metal strip or sheet to form in the strip laterally spaced protuberances 74 and 76 which form, on bending or wrapping of the strip about a suitable anvil or form or die, the barrel strengthening ribs 64 and 66. The central section of the strip also is stamped to form, on opposite sides of its mid-point, fingers 78 and 80 which are separated from the strip along lines, or by incisions or cuts, 82 and form on bending of the strip the resilient leg portions 32 and 34, the fingers 78 and 80 being integrally joined to laterally projecting tabs 84 and 86 which provide the dependent tabs 40 and 42 and the outwardly bent lug portions 44 and 46 of the retainer.

Opposite end sections of the strip are formed with square openings 88 and 90, the end sections forming the side flanges 28 and 30 in the overlapped end portions 24 and 26 of the retainer, the openings 88 and 90 being thereby aligned or brought into registration to receive the nut 56. The end sections are also formed with the projections 92 and 94 which form the latch lugs 48 and 50 of the retainer.

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It will be evident that the blank 72, as shown in Fig. 7, may be formed by a minimum of stamping operations and thereafter by a simple bending operation, a simple assembly operation, and a simple staking operation formed into the completed retainer structure.

In use, the retainer is snapped into assembled position with an adapter plate or panel 96, having a pair of rectangular openings 98 and 100 and a pair of slots 102 and 104, the adapter panel being spot welded or otherwise secured to the face panel 106 of the door structure 108, the face panel having for example an intumed or rebent end portion 110 overlapping one end of the adapter panel and the side flange 112 of the door structure. The face panel 106 of the door structure and the adapter panel are provided with the usual aligned openings to receive the cylinder lock 68 having the peripheral flange 114 overlying the edge of the opening in the face panel and limiting the inward movement of the cylinder lock. It should be noted that the cylinder lock is provided with the usual recess 116 to receive the positioning and locking set screw 70 of the retainer. In assembling the retainer with the adapter panel 96, the portions 44 and 46 of the tabs 40 and 42 are first introduced into the rectangular openings 98 and 100, as illustrated in Fig. 5, and the retainer moved laterally until the latch lugs 48 and 50 are aligned with the slots 102 and 104. As exemplified in Fig. 5, the retainer then is pushed toward the adapter panel 96, the curved under camming edges of the nose portions 52 and 54 of the latch lugs engaging the forward wall of the slot 102 or 104 so that the latch lugs cam the retainer along the panel against the resiliency of the arms 32 and 34 until the latching lugs snap through the slots 102 and 104 and the resilient arms snap the retainer back along the panel so that the shouldered latch lugs interlock with the forward end walls of the slots 102 and 104, the dependent tabs 40 and 42 resiliently and strongly engage the rear walls of the openings 98 and 100 and the shouldered tabs 44 and 46 interlock with the rear end walls of the slots 98 and 100.

The cylinder lock 68 is then introduced or inserted through the aligned openings in the face panel 106 and the adapter panel 96 and then through the cylinder retainer. The set screw 70 is then tightened by inserting a screw driver or other proper tool through an opening 118 in the side flange 112 of the door. When the set screw 70 is tightened it not only enters the opening 116 in the cylinder lock to fix the outer barrel of the cylinder lock against turning but also urges the retainer into frictional engagement with the lock barrel to prevent rotational vibration thereof. Since the cylindrical retainer abuts the adapter panel and extends therefrom with the axis of the barrel substantially perpendicular to the panel it provides an axially rigid and unyielding mounting means retaining the lock against axial displacement or vibration, the snug frictional fitting of the retainer with the cylinder lock also aiding in preventing axial vibration. It will also be evident that the retainer will accommodate itself to substantial differences in the external diameter of the cylinder locks. Even if the external diameter of the cylinder lock is substantially less than the internal diameter of the barrel retainer, on tightening of the screw 70 the wall of the retainer will be forced into a snug fit with at least one-half of the periphery of the cylinder lock for a relatively long axial distance

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so that a strong resilient and frictional retaining action is secured.

If the cylinder lock becomes broken or impaired in its functioning, it is a very simple matter to remove and replace it. Any adherence of the lock to the retainer may be quickly overcome by striking the screw driver inserted through the opening 118, to loosen the screw 70, so as to shift the retainer laterally of its axis and the axis of the lock.

The resiliency of the arms 32 and 34 permit this lateral forced shifting of the retainer without damage to it and insures its proper repositioning to receive the new lock.

In the form shown in Figs. 8 to 10, the retainer 20A is formed to provide automatically self-interlocking end portions and the nut 120 is snapped into assembled position therewith after forming of the retainer. The retainer 20A is formed with a cylindrical body portion or barrel 122 having angularly spaced work or panel engaging feet 124 at its lower end and resilient rearwardly extending arms 126 and 128 having depending tabs 130 and 132, the tabs having outwardly turned lug or tab portions 134 and 136. The end portions 138 and 140 are bent at right angles to the connecting flange portions 142 and 144 and lie in a common plane, the end portions having semi-circular recesses 146 and 148 which form an opening through which the locking screw 149 is inserted for threading in the nut 120.

The co-planar, slightly vertically spaced end portions 138 and 140 are interlocked in the common plane by inturned lugs or flanges 150 and 152 formed at the ends of the connecting flanges 142 and 144, the lug 150 overlying the free end of the end portion 138 and the lug 152 overlying the free end of the end portion 140. An enclosing and mounting housing for the nut 120 is formed by the connecting flanges 142 and 144 and inwardly bent lugs 154 and 156, 158 and 160, formed at the upper and lower edges of the connecting flanges. The lugs 154 and 156 are also interlocked with the end portions 138 and 140 to prevent longitudinal movement of these end portions and the consequent separation of the connecting flanges. For that purpose, the end portions are formed with lugs or projections 162 and 164 respectively interlocking with lateral lug portions or fingers 166 and 168 of the inturned lugs 154 and 160. The lugs 156 and 158 may provide similar lateral lug portions or fingers also overlapping the free edges of the end portions to limit the inward bending of these lugs.

It will be evident that the lugs 150 and 152 form short end portions which overlap the longer opposite end portions 138 and 140.

The nut 120 is retained in the housing formed by the end portions 138 and 140, the connecting flanges 142 and 144, and the inturned lugs 154, 156, 158 and 160 by protuberances 170 and 172 struck inwardly from the connecting flanges to form latching shoulders to engage the inner face of the nut. The retainer being of sheet metal, the nut may be snapped into position over the protuberances 170 and 172 after the retainer end portions have been interlocked.

The barrel retainer 20A is also formed with dependent latch lugs 174 and 176 similar to the latch lugs 48 and 50 and the retainer snapped into assembled position on the plate or adapter panel 96 in the same manner as the retainer 20. The outwardly turned tab portions 134 and 136 of the tabs 130 and 132 and the latch lugs 174 and 176 secure the retainer against axial move-

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ment of the retainer in one direction relative to the panel while the foot portions 124 and the lower edge of the retainer, engaging the upper surface of the panel, secure the retainer against axial movement in the opposite direction.

The resilient arms 126 and 128 secure the retainer against vibration and maintain the shoulder of the latch lug interlocked with the panel and thereby permitting wide tolerances in the dimensions of the retainer and the spacing of the mounting openings in the adapter panel, as is the case with respect to the like parts of the retainer 20.

The barrel retainer 20A may be formed from a one-piece sheet metal blank 178, as shown in Fig. 11, the blank having along its lower edge projections 180, which when bent outwardly form the feet 124; shouldered lugs 182 which form the latch lugs 174 and 176; shouldered lugs 184 which form on bending the nut mounting and interlocking lugs 158 and 160, and lugs 186 which project from oppositely directed strips 188 separated from the body of the sheet metal blank by lines, incisions or cuts 190. The strips 188 and lugs 186 form, by bending to proper shapes, the resilient arms 126 and 128, the dependent tabs 130 and 132 and their outwardly directed tab portions 134 and 136.

The lower half of the blank is also formed at one end with a section or strip 191 in which is formed a semi-circular recess 148 and a dependent lug 192, the strip 191 and projection 192 forming when properly bent the end portion 140 and the interlocking lug 164. The upper edge of the strip is recessed to form at opposite ends thereof shouldered projections 194 and 196 which form on bending the nut mounting and interlocking lugs 154 and 156. The upper half of the blank at the end opposite the strip 191 is formed with a like strip 198 having a semi-circular recess 146 and an upwardly extending projection 200, the strip 198 and the projection 200 forming when properly bent the end portion 138 and the interlocking lug 162.

The opposite ends of the blank are also formed, in slightly spaced relation to the strips 190 and 198, with projections 202 and 204 which form on proper bending the interlocking lugs 150 and 152. The blank while flat is also formed with the nut latching protuberances 170 and 172. The flat blank 178 may be formed by a minimum of stamping operations from a flat strip and thereafter wound or rolled or pressed in a die to the shape shown in Figs. 8 to 10. The lugs 154, 156, 158 and 160 being bent over the end portions 138, 140, 150 and 152, after the latter have been overlapped, so as to interlock the end portions.

It will be evident that the retainer 20A may be used and assembled with the cylinder lock in the manner as described with reference to the retainer 20.

The modified retainer 20B shown in Figs. 12 to 14 comprises a cylindrical barrel or body 206 having a plurality of angularly spaced pairs of vertically spaced interrupted ribs 208 and a plurality of angularly spaced depending resilient latches 210. Each latch 210 comprises a pair of resilient fingers 212 extending oppositely and arcuately from a central portion 214 by which they are adjoined to the barrel or body 206, the fingers being of the same radius as the barrel or body 206 and having at their opposite free ends latching projections 216 extending outwardly from the fingers and being curved in both vertical and horizontal directions.

The retainer is formed with flanges 218 and 220 in abutting radially extending relation, the free end portion 222 of the flange 218 being bent at right angles and extending over the free end edge of the flange 220. Alternate vertical strips of each of the flanges are bent oppositely to provide a plurality of successive oppositely extending semi-circular double walled sections 223, 224 and 226 receiving in threaded engagement a locking set screw 228. The threads 230 in the semi-circular sections 223, 224 and 226 may be pre-formed or they may be formed by employing a threaded cutting screw as the set screw 228. The end section 222 of the flange 218 is provided with an opening 232 substantially concentric with the semi-circular sections 223 to 226 and the wall of the barrel or body 206 is provided with an opening 234, also concentric with the semi-circular sections.

The adapter or mounting panel 96B, Fig. 15, is formed, for the accommodation of the retainer 20B, with a circular lock receiving opening 238 and with a circular aperture 240 to receive lugs 242 depending from the flanges 218 and 220.

In assembling the retainer with the adapter or work panel 96B, the cam-like latch projections 216 engage the edge of the opening 238, and the clamping latch projections force the latching fingers 212 inwardly until they clear the under surface of the adapter panel and spring radially outward to lock the retainer against axial withdrawal. The lower ones of the ribs 208 serve as supporting feet for the retainer, the retainer also being supported on the inner surface of the panel by the engagement of the lower edge of the flanges 218 and 220 with the surface of the panel.

The locking screw 228 threaded into the semi-circular straps 223, 224 and 226 serves to lock the retainer ends together during hardening of the retainer and until it is assembled with the adapter or work panel. The barrel retainer 20B may be formed in a flat sheet metal blank 244, as shown in Fig. 16, wherein the blank in flat form is provided on opposite sides of the transverse center with protuberances or dimples 246 which form the ribs 208 when the retainer is rolled into circular form. The lower edge of the strip is formed with the inverted T-shaped projections 248 having their opposite end edges provided with suitable dimples so that the projections form the latches 216 when the strip is rolled into the final retainer form.

The end portions 250 and 252 are stamped with adjacent, severed straps 254 and 256 which on alternate projection in opposite directions form the double thickness semi-circular sections which on threading accommodate the locking screw. The end portion 250 is longer than the end portion 252 by an amount sufficient to form the laterally bent end section 222 and this extra length of the end portion 250 is formed with a generally semi-circular opening which forms the opening 232 of the retainer in its completed form. Both end portions are also provided with semi-circular openings 258 and 260 which form on rolling of the strip the wall opening 234 concentric with the threaded strap sections 223, 224 and 226.

The strap sections 223, 224 and 226 may be sheared from the strip stock after the strip has been rolled or curled into circular form and the end portions brought into abutting relation. When the simultaneous shearing and circular forming of these straps is thus accomplished, and the end portions have been brought into abutting relation, the shearing of the straps in close fitting

relation serves to retain the device in circular form pending insertion of the set screw 228.

In the form shown in Figs. 12 to 14, the retainer is provided with an integral nut portion for the reception of the locking screw and that integral nut structure cooperates with the locking screw to hold the end portions 218 and 220 of the retainer in overlapped relation. The work panel also serves through its reception of the lugs 242 to assist in the holding of the end portions 218 and 220 in overlapped position.

Each form of retainer is fabricated from spring metal and then hardened to form a tough, strong and rigid, although in part resilient, retainer for the cylinder lock or the like work piece.

It will be evident from the foregoing description that applicant has provided an improved retaining or fastening device for mounting and securing a cylinder door lock or the like in an apertured panel, and more particularly to the doors or compartments of an automobile; a door lock retainer or fastening device of such structure as to be capable of ready and simple application to the door, to permit ready insertion of the lock in the retainer, to provide most effective means for fastening the lock against axial and rotative movement, to permit ready removal of a broken and defective lock, and to be relatively inexpensive to manufacture and assemble with the door structure or like panel; a cylindrical sheet metal, lock retainer formed from a sheet metal stamping and having free end portions thereof secured in permanent relation by a nut structure secured to or formed integrally with the retainer when rolled or otherwise shaped into the cylindrical form, and a retainer which shall be most effective to secure a cylindrical lock or the like against axial or rotative movement and yet will not become bound to the lock so that a broken or defective lock may be most readily removed and replaced.

It will be obvious that changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A fastener for securing a cylindrical article against axial and turning movement relative to an apertured supporting plate, said fastener comprising a hardened sheet metal strip having a generally cylindrical body part for receiving the article, and laterally extending supporting foot portions adapted to pass through apertures in the supporting plate and interlock with the opposite surface of said plate, said strip having overlapped end portions outwardly of the cylindrical body portion, and means interlocking said overlapped end portions against relative separating movement.

2. A fastener for securing a lock structure to an apertured supporting plate, said fastener comprising a resilient sheet metal member having a substantially cylindrical barrel portion to receive the lock, supporting portions extending laterally from said barrel portion to engage and support the member on said plate, said member having projecting resilient latching arms, said arms having portions extending generally axially of the barrel portion and interlocking latch portions at the free ends of said arms extending substantially normal to the axis of said barrel portion for interlocking engagement with the surface of the

supporting plate opposite the barrel supporting surface of the plate, said member having overlapped and interlocked end portions, and means carried by said end portions projecting into the barrel portion for clamping the lock to said barrel portion of the member.

3. In a fastener as set forth in claim 2 wherein said clamping means comprises a nut fixed to the member and a clamping screw carried by the nut, the nut securing the end portions of the member in interlocked relation.

4. In a fastener as set forth in claim 2 wherein the clamping means comprises a nut and a screw carried by the nut and wherein the sheet metal member has flange and end portions forming a housing for the nut, said flange portions having latching projections securing the nut in said housing, and the flange and end portions being provided with interlocking lugs.

5. In a fastener as set forth in claim 2 wherein the clamping means comprises internally threaded sockets formed integrally with an outwardly extending portion of the sheet metal member and a screw threaded into said sockets and projecting into the barrel of the retainer.

6. A lock retainer comprising a sheet metal strip having a substantially cylindrical barrel portion for receiving a lock structure, laterally extending substantially parallel flange portions formed on said barrel portion, end portions formed on the outer ends of said flange portions and overlapping and extending between said flange portions, work clamping means carried by said overlapping end portions and extending into the barrel portion to clamp the lock structure therein, and resilient latch members and rigid latch members formed on said barrel portion adapted for locking engagement with a work piece to secure the barrel portion thereto.

7. A lock retainer comprising a sheet metal member having a substantially cylindrical barrel portion for receiving a lock structure, a pair of laterally extending substantially parallel flange portions formed on said barrel portion, end portions formed on the outer ends of said flange portions, said end portions being bent substantially perpendicularly to said flange portions and placed in overlapping position, clamping means carried by said overlapped end portions and extending into the barrel portion to clamp the lock structure therein, a pair of resilient leg portions formed on said barrel portion and extending outwardly therefrom, a tab portion formed on the end of each of said leg portions, and a pair of latching lugs formed on said barrel portion, said tabs and said latching lugs being adapted to engage a work plate in locking engagement to secure the barrel portion thereto.

8. A lock retainer comprising a sheet metal member having a substantially cylindrical bar-

rel portion for receiving a lock structure, a pair of laterally extending substantially parallel flange portions formed on said barrel portion, end portions formed on the outer ends of said flange portions, said end portions being bent substantially perpendicularly to said flange portions and placed in overlapping position, said overlapped end portions having an aperture therein, a nut member positioned in said aperture and secured to said end portions, said nut being adapted to receive a clamping member extending into the barrel portion to clamp the lock structure therein, a pair of resilient leg portions formed on said barrel portion and extending outwardly therefrom, a tab portion formed on the end of each of said leg portions, and a pair of latching lugs formed on said barrel portion, said tabs and said latching lugs being adapted to engage a work plate in locking engagement to secure the barrel portion thereto.

9. A fastener as set forth in claim 1 wherein the interlocking means comprises double walled substantially semi-circular sections formed from the overlapped end portions, alternate ones of said sections extending in opposite directions to form a screw receiving and supporting structure, the surfaces of said semi-circular sections defining the screw receiving structure being threaded.

10. A fastener of the type described in claim 2 wherein means integral with said sheet metal member and spaced radially outwardly with respect to the barrel portion thereof is provided to engage the supporting plate and in cooperation with the latching arms prevents rotation of said fastener relative to the supporting plate.

11. A fastener of the type described in claim 2 wherein a portion of at least one of said resilient latching arms is substantially coextensive radially with the barrel portion so that upon mounting of a lock structure therein the resilient latching arm is prevented from movement inwardly relative to the lock structure thereby ensuring continuous interlocking of the latch portions of said latching arms relative to the supporting plate.

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